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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/718,424	11/20/2003	Bruce R. Bailey III	7651	9657

49459 7590 10/13/2005

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EXAMINER	
MCKANE, ELIZABETH L	
ART UNIT	**PAPER NUMBER**
1744	

DATE MAILED: 10/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/718,424	BAILEY ET AL.	
	Examiner	Art Unit	
	Leigh McKane	1744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *061104*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-19, drawn to a method of corrosion inhibiting, classified in class 422, subclass 14+.

II. Claim 20, drawn to a redox measurement cell, classified in class 204, subclass 404.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process does not require the claimed measurement cell as the redox potential can be measured by other means known in the art.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Mr. Mike Martin on October 5, 2005 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-19. Affirmation of this election must be made by applicant in replying to this Office action. Claim 20 is

withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

6. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The redox potential recited by claim 15 does not further limit the redox potential of claim 12, from which it depends through claim 14.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-3, 16, 18, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Fandrich et al (WO 01/59535) or under 35 U.S.C. 102(e) as being anticipated by Fandrich et al (U.S. 2003/0004681).

Fandrich et al teaches a method of maintaining an effective corrosion-inhibiting amount of oxygen scavenger (hydrazine) in a boiler system. The method of Fandrich et al includes intermittently determining a level of hydrazine **6b** (hydrazine reserve) necessary to prevent corrosion of the system and measuring this value at **13**. The level of hydrazine equates to the redox potential of the water and is "established according to the operating experience obtained with the technical facility," and thus at the operating temperature and pressure of the facility. See page 3, paragraph [0026] of US reference. The control system automatically calculates the mount of hydrazine necessary to maintain the hydrazine reserve, i.e. the redox potential, and meters the hydrazine accordingly. See [0025] and [0027].

9. Claims 1-3, 16, 17, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Beyer et al (U.S. 4,775,005).

Beyer et al teaches a method for the protection of steam generators wherein the redox potential of the feed water is continuously determined and if the potentials are at a level which indicate the danger of corrosion, adding conditioning substances (hydrazine) to the feed water. See col.1, lines 49-67; col.2, lines 5-49; col.4, lines 58-62.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Fandrich et al or Beyer et al, both in view of Morimoto et al (JP 2003-254503).

Fandrich et al teaches adding hydrazine between the condenser and the feed water entry,

but does not disclose the range of oxidation-reduction potentials or the use of a silver/silver chloride electrode. Beyer et al discloses adding hydrazine to the feed water and the use of a silver/silver chloride reference electrode (col.3, lines 8-11). Beyer et al further teaches a redox potential range of 100 millivolts (0.1 V) but does not disclose a particular range. Morimoto et al, like both Fandrich et al and Beyer et al, teaches the control of corrosion in high temperature and high pressure boiler systems. Morimoto et al discloses measuring and redox potential of the water using a silver/silver chloride reference electrode (KCl water fill) and feeding hydrazine or oxygen in response to these measurements. See machine translation, paragraphs [0005], [0011], [0026]. In Figure 5, the graph evidences that the line dividing the two desirable phases of iron (Fe_3O_4 and Fe_2O_3) is located at roughly -0.2 to -0.9 V and a pH of 6+. Thus, in order to maintain the favorable formation of hematite and magnetite over Fe, Fe^{2+} or Fe^{3+}, it would have been obvious to maintain the redox potential within the range disclosed by Moritmoto et al.

Furthermore, one of ordinary skill in the art would have found it obvious to use the reference electrode disclosed by Morimoto et al as the measuring means of Fandrich et al, as being suitable for use in the high temperature and pressure environment of Fandrich et al.

14. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fandrich et al, Beyer et al, and Morimoto et al as applied to claim 6 above, and further in view of Nakajima et al (US 6,402,984).

While Morimoto et al teaches maintaining the pH at 8.0-9.3 or 9.3-9.6 at a redox potential of at roughly -0.2 to -0.9 V, depending upon which type of iron is being formed, the combination above is silent with respect to an all carbon steel system and a sodium sulfite scavenger. Nakajima et al discloses preventing corrosion within boiler system using a sodium

sulfite oxygen scaventer. See Abstract and col.4, line 27. Nakajima et al further teaches that it was known in the art at the time of the invention that "carbon steel is widely used to make the water tubes in boilers" (col.1, lines 31-36) and that oxygen scavengers can be added to prevent this corrosion.

It would have been obvious to one of ordinary skill in the art to employ the method of Fandrich et al or Beyer et al, both with Morimoto et al, to control corrosion in carbon steel systems, as carbon steel is commonly used to construct boiler systems and because oxygen scavengers are commonly used to prevent corrosion in carbon steel systems. Moreover, one would have found it obvious to substitute sodium sulfite for the hydrazine used by the combination, because Nakajima et al teaches that sulfites are superior corrosion inhibitors to hydrazine (col.2, lines 1-11) and to optimize the redox potential disclosed by Morimoto et al dependent upon the particular oxygen scavenger being used.

15. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fandrich et al, Beyer et al, Morimoto et al, and Nakajima et al as applied to claim 7 above, and further in view of Slovinsky (U.S. 4,269,717).

While Morimoto et al teaches maintaining the pH at 8.0-9.3 or 9.3-9.6 at a redox potential of at roughly -0.2 to -0.9 V, depending upon which type of iron is being formed, the combination above is silent with respect to using carbohydrazide as the oxygen scavenger. Slovinsky discloses known boiler additives for oxygen scavenging, including hydrazine and carbohydrazide. As Slovinsky teaches in Example 5 that "carbohydrazide was comparable or superior to the hydrazine, at carbohydrazide levels half those of the hydrazine," it would have been obvious to substitute carbohydrazide for the hydrazine used by Fandrich et al and Beyer et

al. Moreover, it would have been obvious to optimize the redox potential disclosed by Morimoto et al dependent upon the particular oxygen scavenger being used.

16. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fandrich et al, Beyer et al, Morimoto et al, and Nakajima et al as applied to claim 7 above, and further in view of Moon et al (U.S. 6,391,256).

While Morimoto et al teaches maintaining the pH at 8.0-9.3 or 9.3-9.6 at a redox potential of at roughly -0.2 to -0.9 V, depending upon which type of iron is being formed, the combination above is silent with respect to using erythorbic acid as the oxygen scavenger. Moon et al teaches removing dissolved oxygen from steam generating systems using known oxygen scavengers such as hydrazine and erythorbic acid. See col.6, lines 19-22. As Moon et al evidences that erythorbic acid is a functional equivalent of hydrazine it would have been an obvious substitute in the methods of the above combination. Moreover, it would have been obvious to optimize the redox potential disclosed by Morimoto et al dependent upon the particular oxygen scavenger being used.

17. Claims 11, 12, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fandrich et al, Beyer et al, and Morimoto et al as applied to claim 6 above, and further in view of deSilva et al (U.S. 4,574,071).

With respect to claims 11, 12, and 14, Fandrich et al or Beyer et al, both with Morimoto et al teach a pH of 8.0-9.3 or 9.3-9.6 at a redox potential of at roughly -0.2 to -0.9 V, depending upon which type of iron is being formed, the combination does not disclose a mixed metallurgy system containing copper. DeSilva et al discloses using removing dissolved oxygen from copper containing mixed metallurgy steam generators using hydrazine. See Abstract; col.1, lines 42-45.

As hydrazine has been shown by deSilva et al to be historically used for oxygen scavenging in mixed metallurgy systems, it would have been obvious to use the methods of Fandrich or Beyer et al, with Morimoto et al for corrosion prevention in these types of systems. Moreover, it would have been obvious to optimize the redox potential disclosed by Morimoto et al dependent upon the particular oxygen scavenger being used.

18. As to claim 15, Figure 5 of Morimoto et al illustrates that higher redox potentials (as high as 0.85 V) will permit the formation of hematite at the claimed pH range. Thus, one of ordinary skill in the art would have found it obvious to optimize the redox potential and pH based upon the particular scavenger used.

19. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fandrich et al or Beyer et al as applied to claim 2 above, and further in view of Morimoto et al and Pierce et al (U.S. 5,236,845).

Neither Fandrich et al nor Beyer et al disclose the materials from which the boiler system has been constructed or the pH. Morimoto et al teaches maintaining the pH at 8.0-9.3 or 9.3-9.6 at a redox potential of at roughly -0.2 to -0.9 V, depending upon which type of iron is being formed. It would have been obvious to maintain the pH within the methods of Fandrich et al or Beyer et al to fall within the range of Morimoto et al for the reasons disclosed by Morimoto et al. Moreover, Pierce et al discloses that ferrous boiler systems are prone to corrosion due to dissolved oxygen and that the use of oxygen scavengers, such as hydrazine, is known in the art for the prevention of this corrosion. See col.4, lines 27-38. Therefore, it would have been obvious to one of ordinary skill in the art to apply the methods of Fandrich et al or Beyer et al,

both in view of Morimoto et al to all ferrous boiler systems, as one would have had an expectation of success in doing so.

20. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fandrich et al in view of Beyer et al.

Fandrich et al teaches the intermittent measuring of redox potentials. Regardless, the continuous measuring of redox potentials is evidenced by Beyer et al in a similar method of corrosion control in boiler systems. As continuous measurement of the redox potentials permits detection and elimination "at the earliest possible moment" (col.1, lines 63-67 of Beyer et al), it would have been an obvious modification to the method of Fandrich et al..

Conclusion

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leigh McKane whose telephone number is 571-272-1275. The examiner can normally be reached on Monday-Thursday (5:30 am-2:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Kim can be reached on 571-272-1142. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Leigh McKane

Leigh McKane
Primary Examiner
Art Unit 1744

elm
11 October 2005